

NOTES ON THE DIOPTIDÆ (LEPIDOPTERA)

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The two recent papers on the Dioptidæ, Prout's generic revision¹ and Hering's illustrated review,² together make a monograph of the family, and for the first time make a complete arrangement possible. The following notes are largely based on material in the Cornell University collection, and in the U. S. National Museum, now containing the very rich Dognin collection.

Scotura. I think the number of species will have to be largely reduced in the *fulviceps* group. This is a wide-spread species, with both maculate and immaculate forms in at least part of its range, as well as local variation. As I see it *fulviceps* Felder and *distincta* Hering, of the Amazon, which we took together, are forms of the same Amazonian race, while the case is similar with *intermedia* and *nigreta* Warr. and *abstracta* Prout, which represent the Guiana race. The types of *nervosa* Schs. were from Venezuela.

The female of *Euchontha frigida* Wlk. (*sublactigera*) seems to remain a mystery. Our 1920 expedition caught a series of males, but as usual without a single female. Yet the species is not really rare, and it seems as if the female even if dimorphic, should have been described. On the assumption that it would be probably some mimetic form, and without the special venational characters of the male, I sought through the females of the family and found only one with the characteristic apical spot on the hind wing, *Myonia citrina*. Unfortunately that is certainly the female of *capena*. We have a male of *clareta* Warr., and as the type is really a female, this gives one clue to the behavior of the genus. In this case the special venation has disappeared in the female, which would go well enough in *Tithraustes*. The pattern is not unlike in the sexes, but our male has the grayish hind wing shown in the Seitz figure (69 i 7).

¹ *Novitates Zoologicae* 25, 395; 27, 508.

² Seitz's "Macrolepidoptera of the World" vol. 6, 501 ff., with plates 68-71.

Dioptis and **Josia**. We have no guide as yet through these complicated genera, so the following keys, though incomplete and artificial, may be of some use. In the case of *Dioptis* I assume that there were three transverse bands across the wing in the archetype, any two of which may actually appear: 1, a median across the whole height of the cell and then directly across to the tip of Cu_2 , before the anal angle; 2, a postmedial, from at or near the upper angle of the cell, diverging out, and usually leaving some transparent spots between itself and the lower angle of the cell, then running to near the fork of M_3 and Cu_1 , turning a sharp angle, and when complete running parallel to the outer margin, to the inner margin; 3, a subterminal band across the apex. In interpreting the pattern, brown counts as black, rather than as white.

1. Fore wing with a complete medial black band,³ running the whole height of the end of the cell, and then to the inner margin at and before the end of cell Cu_2 ; postmedial band, when present, nearly straight.
2. Median and postmedial bands similar, entirely separate and parallel, the latter less than a third way from the end of cell to apex.
 - peregrina**.
2. Postmedial band, when present fused with medial at costa, and usually for the whole height of the cell, then diverging from it and running to the outer margin along Cu_1 , leaving an elongate transparent space in cell Cu_1 .
3. A subterminal band nearly half way between end of cell and apex, visible at least below, the apex sometimes largely suffused with black above.
4. Postmedial band appearing as an outer fork of the median, running obliquely across from the medial to the subterminal and covering Cu_1
 5. Hind wing tawny.....**æliana**
 5. Hind wing with tawny submarginal stripe only.....**dentistriga**
 5. Hind wing without tawny or orange above.....**omega**
4. No heavy black bar or shade covering subterminal portion of M_3 and Cu_1 , or at most such a bar about half as heavy as that on Cu_2 , in dark specimens.
 5. Markings wholly black, the border of the hind wing when broad, extending in a triangle to the fork of M_3-Cu_1
 - phelina**, **areolata**, **restricta**, **columbiana**⁴

³ In some specimens of *phelina* the median band is reduced to a faint and irregular shade, but there is no postmedial band, only a subterminal in its usual position, and filling cell M_3 .

⁴ *D. omega* of Hering seems to be an aberration of *phelina*, but is I believe incorrectly identified. The forms of *phelina* which I have seen can be

5. Hind wing with a broad even border, containing a tawny stripe
 6. A tawny spot at anal angle of fore wing above **roraima**
 6. No tawny spot at anal angle of fore wing, a post-medial tawny costal spot, visible below, and almost always above **cyma**
 6. No tawny on fore wing; an even tawny border on hind wing above and below
 7. White areas at end of cell and subapically, both cut by black veins **trailii**
 7. White apical spot solid, the postmedial one cut by the black veins **angustifacia**
 7. Both white areas solid white, not cut by dark veins
leucothyris
 3. Apex broadly black half way in to end of cell, without a separate subterminal band
 4. Postmedial band present as a heavy black bar obliquely across Cu_1 from lower angle of cell to lower end of the black (or partly tawny) apical area, enclosing a long oval transparent spot in cell Cu_1 ; black streak in cell of fore wing confined to its upper portion
pallene (not of Hering) ♂, **egla** ♀, **phædima** ♀, **climax** ?
 4. Cu_1 without a thickened black line, typically white
 5. Black filling of cell confined to its upper portion, the lower part transparent
ilerdina (*opaca* of Hering), **tessmanni**, **charon** (*pallene* of Hering), **curvifascia** Prt., **egla** Hering, not Dr., **zarza** Dgn.
 5. Black filling of cell covering its lower portion, leaving a slender transparent strip along R
meon, **nigrivenia** (*ilerdina* Hering, not Bates)
 1. Median band absent, there being no black connection between lower angle of cell and inner margin at tip of Cu_2 ; postmedial band well developed, practically always leaving some transparent spots beyond lower angle of cell, typically angulate at the fork of M_3 and Cu_1 , and continued, but often very faintly, to inner margin near anal angle
 2. Postmedial band of even width, angulate, but not touching either cell or outer margin **indentata**
 2. Postmedial band touching upper angle of cell, or connected to it by blackish suffusion, running directly across to outer margin, then faintly if at all continued to inner margin
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- separated as follows; I have seen no *columbiana*, and only ♀ *restricta*:
- a. Apical patch solid white **phelina**
 - a. Veins in apical patch black
 - b. Black stripes half as wide as the spaces between them **restricta**
 - b. Black stripes much wider **areolata**

3. Postmedial band reaching outer margin along M_3 ⁵
candelaria, *pellucida*, *symoides*, *nivea*
3. Postmedial band reaching outer margin at Cu_1
4. Hind wing with tawny stripe in border
cheledonis, *uniguttata*, *incerta*
4. No tawny, the postmedial stripe ending broadly at tip of Cu_1 ,
without a branch to inner margin cutting off a spot in tip
of cell Cu_1 *charila*

In the majority of cases I believe the final groups are each composed of a single slightly variable species, and that the characters based on the tawny markings may also be of merely variational value. On the other hand the forms figured by Hering as *egla* and *zarza* seem distinct from anything for which we have a valid name.

I should put Hering's two species, *peregrina* and *indentata*, at the head of two main groups, as they show in a primitive way the two types of medial and postmedial bands; they are evidently related, and stand in contrast to all the others in the separate median and postmedial bands at the costa. A check-up of Seitz's figures with the original descriptions shows several misidentifications, which I have indicated, and there may be more among species unknown to me. The meon group, including the "*ilerdina*" of Seitz, contrasts with all the rest in the position of the black in the cell, and perhaps should be more completely isolated, but I believe it is an advanced rather than primitive form.

JOSIA

As in *Dioptis* the present key is merely a first attempt, and will doubtless need a good deal of revision. I believe there are not as many species as we list, the details of marking, and even the presence or absence of pattern on the hind wing being apparently of less than specific value. On the other hand the various patterns of the abdomen seem of real value.

1. Abdomen with middorsal and lateral pale (yellow) stripes
 2. Hind wing marked with white *group dorsivitta*
 2. Hind wing marked with red *group draconis*
1. Abdomen with dorsum wholly black, with lateral orange stripes or none
 2. Hind wing wholly black, fore wing with orange stripe oblique or transverse

⁵ I believe all these names represent one species.

3. Hind wing overcast with blue..... *liare*
3. Hind wing dull black
 4. Transverse stripe of fore wing extending toward or to base just below costa *fluonia*
 4. Stripe simple, transverse..... *ena* (*tryma*)
2. Hind wing with orange or yellow markings, concolorous with those of fore wing
 3. Fore wing with longitudinal basal and oblique subapical stripes. *group megara*
 3. Fore wing with a single transverse stripe across apex
 4. Lemon yellow, even faintly greenish
 5. Stripe broad and rounded, hind wing with border as in *eterusialis* *flavissima*
 5. Stripe short and narrow, ending at fold..... *cercostis*
 4. Markings orange-yellow
 5. Fore wing with a broad stripe covering the fork of Cu_2 as well as M_3 and Cu_1 *eterusialis*
 5. Fore wing with a narrow stripe, covering tip of cell and fork of M_3 and Cu_1 only
 6. Hind wing with a narrow black border, a quarter width of wing, the yellow extending to base..... *fornax*
 6. Hind wing with more black, its base black
 7. Stripe of fore wing broad, extending well below A, and only linearly separated from inner margin, on hind wing small and cut off slightly beyond cell; under side of abdomen *white*..... *coatepeca*
 7. Stripe of fore wing ending in a point on A, not resting on inner margin; under side of abdomen mainly or wholly concolorous blackish (*vittula*)
 8. Stripe of hind wing broad and almost squarely cut off at fork of M_3 and Cu_1
 9. Stripe $2/3$ width of wing..... *angulosa* Wlk.
 9. Stripe $1/2$ width of wing..... *morena* Warr.
 8. Stripe extending (as a blunt point above M_3) well beyond fork of M_3 and Cu_1
vittula Hbn., *constricta* Warr.
3. Fore wing with a longitudinal stripe only
 4. Stripe of fore wing falling short of the outer margin by nearly 3 mm., hind wing with black border
 5. Stripe broad, at the end of the cell extending from above Rs to fold..... *gopala*
 5. Stripe narrow, extending from middle of cell to Cu_2 . *patula*
 4. Stripe of fore wing almost reaching outer margin
 5. Hind wing with a tawny costal stripe, covering most of Sc, and down to or even over R

6. Black medial stripe practically reaching base, and practically filling cell, or if limited to upper half of cell, with dorsal half of wing wholly tawny.....(*auriflua*)
7. Stripe of fore wing crosses A only near base, mostly lying above it.....**a. flavipars**
7. Stripe running along vein A to middle of wing or further
8. Hind wing with black solid on basal half to below fold; stripe of fore wing practically reaching margin
9. Stripe of fore wing with its boundary running along A to $2/3$, then abruptly leaving it; in the types with a small orange post-medial dash in radial region
- a. a. form scalata**
9. Stripe gradually diverging from A beyond middle; no costal stripe.....**a. auriflua**
8. Black area of hind wing mostly bounded by Cu; strip of fore wing falling $1\frac{1}{2}$ mm. short of margin **a. inaequiflexa**⁶
6. Black stripe limited to outer half of wing, or narrowly extending to base in forms which have a black wedge on inner margin (sometimes extended into a complete black border above, but then distinct below) (all these forms are from Ecuador and probably are not distinct)
7. Black border of hind wing above broadly (1 mm.) connected with black costa.....**subcuneifera**
7. Connection slender or absent
- glycera, turgida, conifera**
5. Costa of hind wing below black except at base, the stripe extending to middle of cell, then tawny over Cu, but broadly black again over dorsal part of wing except on inner margin
6. Adomen with a transverse tawny stripe on first segment
7. Stripe on fore wing $\frac{1}{4}$ width of wing, crossing M_3 and extending broadly across R.....**cruciata**⁷
7. Stripe on fore wing about $1/8$ width of wing, lying wholly above stem of Cu and M_3**annulata**⁸
6. No transverse stripe on abdomen (a trace in *mono-neura*)

⁶ The forms of *auriflua* intergrade.

⁷ As identified by Dognin.

⁸ In *annulata*, the stripe at the base of the wing lies wholly above Cu, in the superficially similar *ligula*-forms it is mainly below Cu at the base.

7. Fore wing grayish, obviously paler than hind wing
8. Stripe on Cu of fore wing linear, running out to near margin along M_3 **mononeura**
8. Darker, stripe broader, and straight..... **insincera**
7. Ground of wings concolorous
8. Abdomen wholly blackish, without side-stripes
9. Stripe of fore wing deep, orange, lying mostly above Cu..... **aurimutua** (*fulvia*†, *jesuita*?)
9. Stripe yellow, covering most of the stem of Cu
10. Stripe narrow and even, as in *striata*
attenuata
10. Stripe broad at $\frac{1}{3}$ way out, tapering to outer margin, hind wing small
ampliflava (part)
8. Abdomen with a slender, normally interrupted white lateral stripe
9. Stripe of fore wing of even width, at its widest $\frac{1}{4}$ width of wing..... **striata**
9. Stripe diamond-shaped, at the middle more than half width of wing..... **ampliflava** (part)
8. Abdomen with broad orange lateral stripes
9. Costal edge of fore wing wholly black
10. Stripe of fore wing more than half width of wing, the black reduced to narrow borders **lativitta** (*oribia*)
10. Stripe about $\frac{1}{3}$ width of wing
ligula (*fulvia*)
10. Stripe about $\frac{1}{6}$ to $\frac{1}{8}$ width of wing
11. Black touching cell where Cu_1 leaves it on both wings, the orange stripes very slender and somewhat suffused
interrupta
11. The part of Cu bordering the cell located wholly in the orange stripe in both wings
tenuivitta (*identification*?)
9. Costal edge noticeably tawny..... (*ligata*)⁹
10. Tawny area extended, on the upper side extending broadly to M_2 ; and practically filling the cell below (large species) **fusigera**

⁹ The species with black body or only a narrow white stripe, have the yellow area of the hind wing much wider than on the fore wing, in the similar *ligata* forms the stripes are equal in width.

- 10. Tawny area not over $\frac{1}{4}$ width of wing
 - 11. Small, the size of ligula.....**ligata**
 - 11. Larger, the size of fusigera.....**gigantea**
- 10. Tawny stripe less than $\frac{1}{6}$ width of wing; a small species.....**frigida**¹⁰

¹⁰ These ligata forms intergrade both in size and pattern, and I believe represent only one species.